

REMARKS

The specification has been amended to replace blanks with now available reference information.

The Examiner objected to claims 1-10. In claim 1, “separate from an imaging system” was alleged to be confusing since an imaging system can include all the components thereof including connections. Claim 1 has been amended to provide the proper antecedent basis to remove the confusion. Whether the imaging system also includes similar components or not does not render the claim confusing. There is an imaging system and a separate analog-to-digital converter as part of a probe.

Claims 4, 6, 7, and 9 have been amended to provide antecedent basis.

Regarding claim 24, “transducer cables” is a first occurring term, so should not have a preceding “the.” Since “cables” is plural, “a” is also inappropriate. There are transducer cables within the cable. Claim 24 is proper.

In the Office Action, the Examiner rejected claims 1-9, 11, 12, and 14-22 pursuant to 35 U.S.C. § 102(b) as anticipated by Leavitt, et al. (U.S. Patent No. 6,491,634). Claims 10, 13, and 23 were rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Leavitt, et al. in view of Pflugrath, et al. (U.S. Patent No. 6,102,863). Claim 24 was rejected pursuant to 35 U.S.C. § 103(a) as being unpatentable over Leavitt, et al.

Applicants respectfully request reconsideration of the rejections of claims 1-2, 4-20, and 22-24, including independent claims 1, 11, 16 and 20.

Independent claim 1 has been amended with the limitations of claim 3. In particular, claim 1 recites an analog-to-digital converter between the transducer and the releaseable connector where a cable connects the ultrasound transducer to the analog-to-digital converter and a housing connects with the end of the cable and is at least partially around the releasable connector and the analog-to-digital converter.

Leavitt, et al. do not disclose these limitations. Leavitt, et al. provide an ultrasound system 102 connected via a cable 104 to a probe assembly 106 (col. 3, lines 31-35; and Figure 1). Both the transducer 202 and the analog-to-digital converters 214 are in the probe assembly 106 (col. 3, line 62-col. 4, line 3; col. 4, lines 22-31; Figures 1 and 2). The analog-to-digital converters 214 are part of electronics in the probe assembly 106 to reduce the

number of signals to be communicated over the cable 104 to the ultrasound system 102 (col. 3, lines 42-52; and col. 4, lines 53-56). Leavitt, et al. provide a probe assembly with analog-to-digital converters, shown in one housing (Figures 1 and 2), where the cables connect from the probe housing to the ultrasound system 102. Leavitt, et al. teach the transducer, analog-to-digital converter, cable, and cable releasable connector in a different arrangement than claimed. Leavitt, et al. do not provide for a connector housing covering at least part of both the releasable connector and the analog-to-digital converter where a cable connects the ultrasound transducer to the analog-to-digital converter.

Independent claim 11 recites a detachable transducer assembly with an analog-to-digital converter in a connector housing, which is physically detachable from a connector on the system housing. As discussed above for claim 1, Leavitt, et al. position the analog-to-digital converter in the transducer housing, not in the connector housing with a cable between the connector housing and the transducer probe.

Independent claim 16 recites a processor connected between the transducer and releasable connector and in the housing of the releasable connector. As discussed above for claim 1, Leavitt, et al. disclose positioning the processing in the transducer housing, and then connecting the transducer housing to the imaging system with an interface cable (see col. 3, lines 37-52). Leavitt, et al. do not position any processor in the housing of the releasable connector.

Independent claim 20 has been amended to include the limitations of claim 21. In particular, claim 20 recites transmitting electrical signals through a cable of the probe assembly and converting the electrical signals into digital data within a connector housing of the probe assembly. Claim 20 is allowable for the same reasons as claim 1.

Dependent claims 2, 4-10, 12-15, 17-19 and 22-24 each depend from one of the independent claims above, so is each allowable for the same reasons as the corresponding base claim. Further limitations distinguish from the cited references.

Claim 5 recites cables connecting transducer elements to analog-to-digital converters. Leavitt, et al. use cables between the probe assembly and the imaging system. The elements and the analog-to-digital converters are on the same end (probe assembly) of the cables.

Claim 8 recites a digital processor between the analog-to-digital converter and the electrical outputs. Since the analog-to-digital converter is in the connector housing, Leavitt, et al. do not suggest this placement.

Claim 9 recites a switch between the ultrasound transducer and the analog-to-digital converter to bypass analog signals. Leavitt, et al. provide an alternative of an analog sub-beamformer (col. 11, lines 5-8). This embodiment would not even have the analog-to-digital converter and would not provide for a bypass. The T/R switch is a known component for protecting sensitive receive circuits from high voltage transmit circuits, so blocks transmit signals from receive circuits. The T/R switch does not bypass analog signals to the outputs.

Claim 10 recites a demultiplexer connected with the analog-to-digital converter. Pflugrath, et al. use demultiplexers 18, but not connected to an analog-to-digital converter in the connector housing.

Claim 13 recites a combination of a multiplexer and demultiplexer where the demultiplexer is in the connector housing. Pflugrath, et al. multiplex and demultiplex to route signals from elements to different beamformer channels. The demultiplexer is not located in the connector housing, but instead in the probe housing.

Claim 14 recites a serializer housed by the connector housing. The Examiner cites to delay and focus components in the probe assembly, not the connector housing. The delay and focus components are not serializers.

Claim 15 recites a processor in the connector housing. Claim 15 is allowable for the same reasons as claim 16.

Claim 17 is allowable for the same reasons as claim 1.

Claim 23 recites time division multiplexing signals prior to transmission to the analog-to-digital converter and then demultiplexing the signals after converting and before passing. Pflugrath, et al. use multiplexing and demultiplexing for routing to beamformer channels, so do not disclose the recited timing.

CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call Craig Summerfield at (312) 321-4726.

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